REMARKS

Claims 1-24 are now pending in the above-captioned application.

* Applicant notes with appreciation that the Examiner has indicated allowable subject matter.

ALLOWABLE SUBJECT MATTER

Claims 5 and 12 were indicated allowable if rewritten into independent form including the limitations of the base claim and any intervening claims. By the above amendment, claims 5 and 12 have been placed into independent form. New claims 15-19 corresponding to dependent claims 1-4, and 6-7, but dependent on allowable claim 5 have been presented. New claims 20-24, corresponding to dependent claims 9-11 and 13-14, but dependent on claim 12, have also been presented. **Thus, claims 5, 12, and 15-24 are now clearly in condition for allowance.**

DRAWING OBJECTION

The drawings were objected on the grounds that the "air bag" recited in claims 7 and 14 was not shown in the drawings. New Figure 3 has been added showing the use of the air bag in the present invention. In addition, the Specification has been amended to refer to this new Figure 3. Minor typographical errors in the Specification and Claims have been corrected as well.

REJECTION UNDER 35 U.S.C. §102

Claims 1-4, 6, 8-11, and 13 were rejected under 35 U.S.C. §102(b) as being anticipated by Dysarz. Applicant respectfully traverses this rejection.

Applicant appreciates the Examiner's suggestion to remove the "for" language from the claims and has done so by the above amendment.

In order to be complete, an anticipation-type rejection must contain two elements:

1. The reference must qualify as "Prior Art" under one of the sections of 35 U.S.C. §102; and
2. The reference must explicitly teach *ALL* of the features of the claimed invention.

The Dysarz reference has an effective date more than one year prior to applicant's filing date.

Dysarz, however, discloses a wheelchair with pneumatically extendable legs. These legs extend outward from the chair (See Figures) and raise the chair, wheels and all, to a desired height. While the invention of Dysarz no doubt has some utility (e.g., raising a user to bar height), it does not solve the other problems solved by the present invention.

In particular, since Dysarz raises the wheels of the chair off the ground, the device no longer functions as a wheelchair when the legs are extended. Thus, one cannot move into a van or the like with the legs extended (Dysarz does show rear castors, but these are not practical wheels, more like chair castors). Moreover, Dysarz discloses raising the chair, not lowering below a standard height, and thus his device does not solve the problem of hitting your head when entering a van in a wheelchair.

In reviewing the claims, however, it is apparent that this distinction was not clearly set forth in claims 1 and 8 as originally filed. Claims 1 and 8 recite raising and lowering the seating surface, which Dysarz does (albeit by raising and lowering the entire chair). Thus, applicant has amended claims 1 and 8 to recite raising and lowering the seating surface relative to the frame, which clearly Dysarz does not teach. Dysarz raises the entire chair, frame and all. In addition, Dysarz raises the main wheels off the ground. Claims 1 and 8 to recite that all of the wheels remain in contact with the ground during the raising and lowering processes, a feature not taught or suggested by Dysarz.

Thus, applicant submits that claims 1 and 8, as amended, are distinguishable over Dysarz, and thus allowable, and the corresponding dependent claims are allowable as well.

REJECTION UNDER 35 U.S.C. §103

Claims 7 and 14 were rejected under 35 U.S.C. §103 as being unpatentable over Dysarz in view of Finch. Applicant respectfully traverses this rejection.

In order to be complete, an obviousness-type rejection must contain two elements:

1. The references, as combined, must show all the features of the claimed invention (all elements rule); and

2. A *proper* motivation to combine the references must be provided.

In this instance, neither element is present.

As noted above, Dysarz does not teach applicant's claimed invention (as amended) as Dysarz raises the entire chair, not the seat relative to the rest of the chair. Finch teaches the use of a suspension system, again to raise the entire chair relative to the wheels. Finch does not teach or suggest moving the seat relative to the frame.

As claims 1 and 8 have been amended to recite that the seat is moved relative to the frame, applicant submits that the claims are also distinguishable over Finch.

Applicant notes, however, that Finch is directed toward a suspension assembly for a wheelchair, while Dysarz is directed towards extendable legs. Thus, it would be difficult, if not impossible to combine these references, as they are directed toward entirely different problems and provide radically different results. Dysarz isolates and stabilizes the chair, where as Finch provides a suspension for motion. Since Dysarz raises the main wheels off the ground, there is no motivation to combine his references with Finch, who teaches a suspension system, which keeps the wheels in contact with the ground. The references, in effect, teach away from each other.

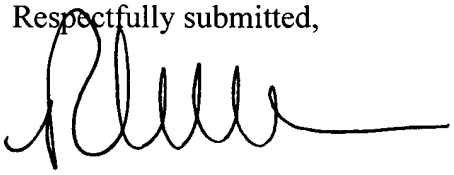
CONCLUSION

Claims 5 and 12 have been placed into independent form as indicated allowable by the Examiner and new dependent claims 15-24 have been added. Thus, claims 5, 12, and 15-24 are clearly in condition for allowance.

Claims 1 and 8 have been amended to more clearly recite that the seat is moved relative to the frame. The Prior Art references cited teach moving the entire chair. Thus, claims 1-4, 6-11, and 13-14 are also in condition for allowance.

An early Notice of Allowance is respectfully requested.

Respectfully submitted,



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Atty. Docket No. SILVA-0001 **PATENT**

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Initial Information Data Sheet

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>Application One::	60/456,344
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LOW-HIGH CHAIR

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims priority from Provisional U.S. Patent Application No. 60/456,344 filed on March 20, 2004, and incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present invention relates to a wheelchair. In particular, the present invention is directed toward a wheelchair with an adjustable height seating surface, which is pneumatically activated.

BACKGROUND OF THE INVENTION

[0003] Buying a van equipped with a wheelchair lift can be a problem due to the considerable cost of a van and the lift. As a result, some people use ramps in order to maneuver a wheelchair into a van without a wheelchair lift. Crump, U.S. Patent No. 4,912,796, issued April 3, 1990, and incorporated herein by reference, discloses an example of such a ramp.

[0004] Unfortunately, it is all too easy to accidentally bump one's head as one is entering or leaving a van. The user either has to purchase a van with a raised door, which is often very expensive, or has to duck or otherwise squat down in the wheelchair when entering the van.

[0005] In addition, there may be situations where a wheelchair user wishes to alter the height of the chair seat. Tables are provided at various heights, from coffee table height to bar height, and a wheelchair user often finds themselves at the wrong height for a given table.

[0006] Vans equipped with handicapped controls can be very expensive to build, as often the floor of the van needs to be made adjustable in order that the wheelchair user is at the right height with respect to the vehicle controls. Hydraulically lowering floors and the like can be quite expensive in addition to hand controls, which are relatively inexpensive. If a wheelchair user could have an adjustable height wheelchair, the cost of converting a van to wheelchair use could be decreased significantly. Given that such an adjustable height wheelchair would allow the use of inexpensive ramps in place of complicated, bulky, and difficult to use lifts, handicapped accessible and operable vans could be made more affordable, and thus more accessible for wheelchair users.

[0007] Of course, traditional office chairs and the like are known to use pneumatic cylinders that are pre-charged and sealed like a pneumatic spring. By releasing a lever, the user can push themselves up or down to a desired chair height.

[0008] For a wheelchair user, however, such a solution may not be workable. To begin with, the traditional pneumatic spring of an office chair serves only to reduce the force required to raise or lower the chair. The pneumatic spring does not actually raise or lower the user in most instances. Rather, the user raises or lowers the chair by altering their weight on the chair, which requires the use of their legs. For most wheelchair users, this may be a problem.

[0009] In addition, most office chairs use a centrally located pneumatic cylinder that acts as a support for the chair. Such a central cylinder may be useful in that it allows the chair to swivel. However, for a wheelchair, such a design may not be suitable, as it may not provide the stability needed for the seating surface.

[0010] Mechanical mechanisms are known in the art for raising and lowering wheelchair seat heights. Bergstrom, et al., U.S. Patent No. 5,520,403, issued May 28, 1996, and incorporated herein by reference, discloses a wheelchair with translating seat and patient lift. While Bergstrom discloses an adjustable seat, note that the seat is designed to be adjusted with a hand crank, used from behind the seat. Thus, a second person is needed to raise and lower the wheelchair user, and the wheelchair user cannot raise and lower themselves. Moving the crank to a position where the wheelchair user can reach it may not be an option, as the crank would either be in the way, or in an awkward position for cranking. In addition, the user may have some other disability that would prevent them from turning such cranks.

[0011] One solution would be to provide a wheelchair with an electrical mechanism to raise and lower the seating surface. Shaffer, U.S. Patent No. 4,231,614, issued November 4, 1980, and Weant et al., U.S. Patent No. 3,807,795, issued April 30, 1974, both of which are incorporated herein by reference, disclose electro-mechanical devices for altering the position of a wheelchair user. While both of these devices may perform their intended function, the weight, complexity, and cost of batteries may make them impractical and too expensive for regular use. A wheelchair should be as light and as inexpensive as possible such that it is easy to roll, and easy to afford for the user.

[0012] Finch et al. U.S. Patent No. 5,772,237, issued June 30, 1998, discloses a suspension for a powered wheelchair using fluid cylinders. Finch explicitly states that his suspension can be lowered to assist in getting in and out of a van, and thus does address one of the problems outlined above. However, Finch uses an expensive and complex suspension system using multiple cylinders and an adjustable suspension in connection with a powered wheelchair. This system might not be adaptable to a manually operated wheelchair, for example.

[0013] Thus, it remains a requirement in the art for a wheelchair with an inexpensive, lightweight, and affordable height adjustment feature.

SUMMARY OF THE INVENTION

[0014] The low-high chair of the present invention provides a specially designed wheelchair with a seat that can be raised or lowered so that the wheelchair can be maneuvered in or out of a van without the risk of bumping someone's head on the roof of the van. The chair may also be adjusted for other purposes, such as driving a van, sitting at tables of various heights, or merely adjusting one's height to get a better view or be at the same height as one's contemporaries (e.g., at a movie theater or the like). The low-high chair of the present invention provides greater convenience for anyone who must use a wheelchair.

[0015] The low-high chair of the present invention comprises components of a typical prior art wheelchair, which measures approximately 38 inches in overall height, 24 to 27 inches in overall length and 20 to 21 inches in overall width. The wheelchair may be equipped with a metal frame, a

plastic seat, a backrest made of plastic and foam and two padded armrests. Other components of the wheelchair may include two plastic push handles, four rubber or plastic wheels and two axles. Alternately, more traditional large wheels may be provided for a self-propelled chair.

[0016] The low-high chair of the present invention also includes an air tank, air shock bearings (optional), a one-fourth by one-inch flat steel plate, an angle iron measuring one inch in length, one inch in width and one-eighth of an inch in thickness, two scissor- style side supports, a valve, two chains measuring four inches in length and two round pins measuring two and one half inches in length by one-fourth of an inch in diameter. These components may be produced from produced from corrosion-resistant metal.

[0017] In use, a user may sit in the low-high chair and wheel it to a ramp placed next to a van. When needed, the chair may be lowered to a height of approximately 14 inches such that one can enter the van without the risk of bumping one's head. The chair may then be returned to a height of approximately 20 inches after use. The chair may also be provided to raise above 20 inches, or to other heights, to provide different lift levels for the user.

[0018] The lift mechanism is operated by a pneumatic cylinder which is powered by an on-board compressed air tank. An inexpensive pneumatic valve may be used to raise or lower the chair, controlled by either the wheelchair user, or an assistant. The pneumatic tank may provide enough stored energy to raise and lower the user several times a day without recharging. A manually operated or small inexpensive electric pump may be used to recharge the pneumatic tank, or the user may recharge it from other sources of compressed air (gas station or the like).

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] Figure 1 is a rear perspective view of the high-low chair of the present invention.

[0020] Figure 2 is an enlarged view of section A of Figure 1, illustrating the scissor-locking pin.

[0021] Figure 3 is a rear perspective view of an alternative embodiment of the high-low chair of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

~~**[0021] [0022]**~~ Figure 1 is a rear perspective view of the high-low chair of the present invention. Note that for purposes of illustration, the chair 110 of Figure 1 is illustrated as a four-wheel wheel chair of the type typically designed to be pushed by others. However, other wheel chair types such as the traditional large wheel chair, designed to be self-propelled, may be used. The apparatus of the present invention may also be applied to other types of chairs, such as powered chairs and the like. However the primary objective of the present invention is to provide the adjustable height feature at a minimum cost and weight, and thus it is primarily intended for use in simpler chair designs.

~~**[0022] [0023]**~~ Chair 110 includes wheels 190, which as noted above may comprise four smaller wheels, including two castor wheels, or may include two castor wheels and two self-driven

larger wheels intended to be driven by the user. As is typical with prior art wheelchairs, chair 110 may include locking brake levers 150 and the other features know for wheelchairs, including a seat, armrests, backrest, and the like.

~~[0023]~~ [0024] Chair 10 includes a scissors lift 120 which may be used to adjust the chair height. Scissors lift may be driven by pneumatic cylinder 130. Pneumatic cylinder 130 may be sized with an appropriate diameter to lift a 250 lb person (or larger) using 50-100 psi air pressure using scissors lift 120. The stroke of pneumatic cylinder may be sized for the intended range of scissors lift 120. In the primary embodiment, this is a range to drive the seating surface from approximately 20 inches to 14 inches, although other ranges are possible as noted above.

~~[0024]~~ [0025] Pneumatic cylinder 130 is driven by compressed air stored in air tank 180. Air tank 180 may comprise an inexpensive compressed air tank such as those sold at local auto parts stores and the like. Such tanks are becoming increasingly inexpensive, and are easily obtained.

~~[0025]~~ [0026] In addition, other types of inexpensive compressed air storage devices may be used. For example, published U.S. Patent Application US 2003/0230451, published December 18, 2003, and incorporated herein by reference, discloses that a compressed air tank can be inexpensively made from a section of 3" PVC pipe and two end caps. Since such pipe is rated for over 100 psi, it can easily handle the pressure of stored compressed air. Alternately, the frame of wheelchair 110 may be sealed and used as a compressed air storage reservoir.

~~[0026]~~ ~~[0027]~~ The use of an inexpensive compressed air storage reservoir to drive pneumatic cylinder 130 allows the apparatus to be manufactured at a much lower cost than a battery powered device. once inside the van, the user can recharge the storage tank using an inexpensive 12 volt tire inflation pump of the variety sold inexpensively at auto parts stores and the like. Thus, energy may be stored much less expensively as compressed air than as electrical power, without the hassles and dangers associated with batteries, not to mention the costs and periodic replacement associated with batteries.

~~[0027]~~ ~~[0028]~~ Alternately, a pneumatic manual pump may be provided for the user to manually charge the storage tank. Thus pump may be provided as part of wheelchair 110 to provide an exercise apparatus and may be optimized to be usable by the wheelchair user and tailored to the user's particular needs and/or disabilities and abilities. In addition, as noted above, the user may simply recharge the tank using a known supply of compressed air such as a gas station compressor or the like.

~~[0028]~~ ~~[0029]~~ Refill valve 170 may be provided to allow compressed air tank 180 to be refilled. Gauge 140 may be provided to monitor the pressure in compressed air tank 180. Control valve 160 may be used to extend and retract pneumatic cylinder 130. To extend pneumatic cylinder 130, control valve 160 may feed compressed air from compressed air tank 180 to the piston side of pneumatic cylinder 130, which in turn will raise scissors lift 120. To retract pneumatic cylinder 130, control valve 160 may bleed compressed air from the piston side of pneumatic cylinder 130, which in turn will lower scissors lift 120.

~~[0029]~~ ~~[0030]~~ Suitable pressure hoses or lines may be used to connect control valve 160 to pneumatic cylinder 130 and compressed air tank 180, as is known in the art.

~~[0030]~~ ~~[0031]~~ Note that for purposes of illustration, all of control valve 160, compressed air tank 180, fill valve 140, and gauge 130 are shown mounted to the back of wheelchair 110. However, in application, such controls and features may be more advantageously mounted so that the chair user may have control over such features. For example, if fill valve 170 and control 160 are mounted near the armrest, the user may be able to adjust the seat height and recharge the system without the need for intervention by others.

~~[0031]~~ ~~[0032]~~ Note that although illustrated as a pneumatic cylinder, other types of pneumatic devices may be used to raise and lower the chair height. For example, automotive air springs such as those sold by AIR LIFT and FIRESTONE RUBBER COMPANY may be used to directly raise and lower the chair seat height. Figure 3 illustrates an example of such an embodiment where an air bladder or spring 330 is substituted for the pneumatic cylinder 130 of Figure 1. Such devices may be less expensive that the pneumatic cylinder shown in Figure 1.

~~[0032]~~ ~~[0033]~~ In addition, a small inexpensive 12 Volt compressor may be mounted to the device such that the user need only plug the device into a automobile cigarette lighter to recharge compressed air tank 180. Note also that compressed air tank 180 may be reduced in size or eliminated in an application where an electric or manual on-board pump may be provided.

~~[0033]~~ ~~[0034]~~ Figure 2 is an enlarged view of section A of Figure 1, illustrating the scissor locking pin. Locking pin 210 may be provided in scissors lift 120 to lock the seat of wheelchair

110 such that the user does not experience a "bouncing" effect due to pneumatic cylinder 130 acting as a pneumatic spring. Locking pin 210 may also prevent the chair from sagging over time if pressure leaks out of pneumatic cylinder 130.

~~[0034]~~ [0035] Thus, the present invention provides an inexpensive, lightweight, uncomplicated, and easy to use chair lift that solves many of the problems of the Prior Art. By using stored compressed air as opposed to stored electricity, the present invention reduces cost and weight.

~~[0035]~~ [0036] Note also that while ~~discloses~~ disclosed in the context of an adjustable wheelchair, the present invention may also be applied concept of using stored compressed air to raise and lower an object in a portable environment.

~~[0036]~~ [0037] While the preferred embodiment and various alternative embodiments of the invention have been disclosed and described in detail herein, it may be apparent to those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope thereof.